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THE NEW ENGLAND BOTANICAL CLUB

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AQUATIC UTRICULARIAS

GEORGE B. ROSSBACH

A KEY BASED UPON LEAF-CHARACTERS FOR THE AQUATIC UTRICULARIAS OF CENTRAL AND NORTHEASTERN UNITED STATES AND EASTERN CANADA

A. Leaves all whorled ..... U. PURPUREA Walt.
A. Leaves chiefly alternate .... B.
B. Foliar divisions terete .... C.
C. Leaves of a single type, usually three or four times, occasionally up to five or six times dichotomous, 2- or less often 3-parted .... D.
D. Leaves three times dichotomous: plants, if flowering, never bearing whorl of inflated petioles .... E.
E. Outline of leaf elliptical, due to pseudopinnate division, basal divisions about .5–.75 mm. in diameter: plant robust, stems about 1 mm. in diameter when dry and mounted, and often somewhat over 1 mm. when fresh and living .... U. VULGARIS L.
E. Outline of leaf circular or slightly oval, basal divisions about .25 mm. in diameter: stems under 1 mm. in diameter ..... U. GEMINISCAPA Benj.
D. Leaves four times, occasionally up to five or six times dichotomous: flowering plants bearing a whorl of inflated petioles at about half-way up the scape; generally flowering annually .... F.
F. Basal divisions of leaf usually not elongate, 0+–10, commonly 3–5 mm. long, not slender, diameter .5 mm. and over: (scapes 15–33, commonly 20–30 cm. long, stout; flowers 3–14, calyx-lobes 4–6 mm. long). Restricted to southern U. S. .... U. INFLATA Walt.
F. Basal divisions of leaf elongate, 5–12, commonly 8–10 mm. long, slender, diameter .25 mm. and less: (scapes 6–26, commonly about 15 cm. long: flowers 2–5, commonly 3, calyx-lobes 3–4 mm. long). Maine southward. U. INFLATA Walt. var. MINOR Chapm.
C. Leaves of one or two types, according to type of branches, whether generally associated with scapes or purely vegetative: branches generally associated with scapes always present, these with leaves one or two,

sometimes three times dichotomous, 2- or rarely a few 3-parted at bases, sparse, and slightly or not at all overlapping; branches of specialized vegetative type usually present on U. FIBROSA, these 5–9 cm. long, with crowded leaves nearly all three times dichotomous, basally 2–3-parted, when 3-parted not diverging at one exact point, bladders few or none....G.

G. Leaves characteristic of branches generally associated with scapes....H.

H. Leaves once dichotomous, rarely with abbreviated third division, usually not overlapping, bladders scattered, variable in size, and many near ends of leaves.....U. GIBBA L.

H. Fully developed leaves twice dichotomous, slightly overlapping, bladders scattered, but generally homogeneous in size (some branches growing under mud having bladder-bearing leaves much reduced in size and dichotomy, thus similar to certain branches on U. MINOR).....U. BIFLORA Lam.

G. Leaves of both types present, those of specialized vegetative branches as well as of branches generally associated with scapes; bladders most numerous near stems.....U. FIBROSA Walt.

B. Foliar divisions flat....I.

I. Margins of terminal divisions minutely and sharply serrate, leaves bearing few or no bladders, bladders mostly or wholly confined to the always present specialized branches, leaves basally 3-parted, divisions narrow, but usually distinctly flattened, all of one general form....J.

J. Apices of terminal divisions rounded or nearly so (save for uncommonly delicate condition in deep water), mucronate; bladder-bearing branches having no leaves.....U. INTERMEDIA Hayne.

J. Apices of terminal divisions acuminate; bladder-bearing branches having a few small leaves or none. Known only very locally in No. Am.....U. OCHROLEUCA Hartm.

I. Margins of terminal divisions entire, leaves all or most bearing bladders, few or no branches specialized for bladders alone, leaves usual 3-parted basally, but some on certain very slender plants 2-parted, altogether of two general forms, one very slender and slightly flattened, bearing a number of bladders (this the common form), the other broadly and distinctly flattened, less dichotomized, more abbreviated, bearing very few or no bladders (this the less frequent form and mostly of shallower water or of spring growth).....U. MINOR L.

A Key to the Winter Buds

A. Bud an elongate, thickened end of the stem, 1–2 mm. in diameter, bearing crowded, but not closely imbricated, abbreviated and incurled leaves, buds terminating all autumnal branches.....U. PURPUREA Walt.

A. Bud a rounded mass of divided, densely crowded, abbreviated and imbricated leaves....B.

B. Foliar divisions of buds bordered on two sides with stout gray hairs, flattened....C.

C. Buds 1–2 cm. long, oval, often one-sided or two-parted, composed of very many pseudo-pinnate, severally divided, basally 2-parted, small leaves, divisions of leaves flattened, elongate, narrowly triangular, and bordered with loose tufts of small hairs. . . . . U. VULGARIS L.

C. Buds 3–10, commonly 5–7 mm. long, oval to elliptical, never one-sided or two-parted, composed of many short, broad, few-times-divided, basally 3-parted very small leaves, divisions of leaves much flattened, squamiform-triangular, and bordered with dense tufts of coarse hairs. . . . . U. INTERMEDIA Hayne.

B. Foliar divisions of buds not bordered at all with hairs, bearing but a few setae as on mature leaves, either more or less terete or distinctly and broadly flattened. . . . D.

D. Buds round or compressed slightly at each end, 1.5–4, sometimes 5 mm. across (in growth and formation unique and quite comparable to the head of a cultivated cabbage, save for the narrow leaves), color reddish green, foliar divisions of completely formed winter bud distinctly flattened. . . . . U. MINOR L.

D. Buds rounded and usually somewhat one-sided and elongate, 5 mm. or much less in diameter, always merging to an attached piece of living stem bearing some leaves, color green, foliar divisions terete. . . . E.

E. Buds, when present, 2–5 mm. in diameter, formed of loosely integrated, small and slender leaves. (Fruit from cleistogamous flowers common, other fruit rare.) . . . . . U. GEMINISCAPA Benj.

E. Buds often not forming, but when present 1 mm. and less in diameter, formed of few, loosely integrated, small leaves, thus scarcely differing from the continually unfolding bud of midsummer: branches and buds, or fruit, forming the next generation. U. INFLATA Walt., U. INFLATA var. MINOR Chapm., U. GIBBA L., U. BIFLORA Lam., U. FIBROSA Walt.

The species under sections E are coastal plain types. Development in them of winter buds is slight or lacking. *U. biflora* and *U. fibrosa* are restricted coastal plain types extending no farther north than southeastern Massachusetts. These two species never develop true winter buds. Winter buds, then, are characteristic of our species occupying regions where they must lie dormant through a long winter. *U. geminiscapa* forms quite unspecialized winter buds, though often growing in very cold climates, but, as a compensation, produces many cleistogamously formed fruits. The species under E-2, with scarcely any development of winter buds, commonly flower and fruit in the usual manner, whereas those species forming specialized winter buds usually bear fewer or even no flowers, and much less commonly produce any fruit. Though *U. purpurea* and *U. vulgaris* are often found flowering and both form some fruit, *U. minor* and *U. intermedia* seem rarely to flower.

Ruth P. Rossbach del.

Utricularia: all figs. × 1; for Explanation see end of text.

Geographical Distributions and Habitats

The geographical distribution of the genus *Utricularia* offers strikingly clear-cut and widely applicable examples of the major plant dispersals of the earth, distributions made most significant by Prof. M. L. Fernald.[1]

One group of the genus represented with us is circumboreal (and only two to several of its species grow locally as far south as central Africa and southernmost United States).

The other group, or groups, occupy the North American coastal plain, the southern Great Lakes region, the lower Mississippi River Valley and adjoining lowland areas, and parts of the West Indies, Mexican Plateau, Central America, South America, Australia, Tasmania, Philippine Islands, and Asia, especially in the south, the restricted region about the Mediterranean Sea, and the valleys of, at least, the Nile, Congo, Zambesi, and Niger Rivers of Africa. Many of the areas occupied by this second group are known to be geologically ancient.

The circumboreal group grows typically under water, save for the flowering scape. The group of more southerly dispersal comprises terrestrial as well as truly aquatic forms, and is very diversified. Representative of the circumboreal species are *U. vulgaris* L. and var. *americana* A. Gray, *U. neglecta* Lehmann, *U. minor* L., *U. Bremii* Heer, *U. occidentalis* A. Gray, *U. intermedia* Hayne, and *U. ochroleuca* A. Hartm.

U. vulgaris, including var. *americana,* is frequent in quiet or sluggish water, and in this country known from the Straits of Belle Isle, Labrador and Newfoundland, south commonly through New England and western New York, then becoming less frequent, though occurring, southward to Dade Co., Florida, west, in the north, to Alaska and British Columbia, and in the south, west through Louisiana to Texas and locally to southern California, and present, where habitat is suitable, north and south between these outlined boundaries, especially in the East, the region of the Great Lakes, the Rocky Mountains in general, the Sierra Nevada, Cascades, and Pacific Coast; also in Asia, and in all of Europe.

[1] "Specific Segregations and Identities in some Floras of eastern North America and the Old World," Rhodora, xxxiii. 25–63 (1931).

"Recent Discoveries in the Newfoundland Flora," Rhodora, xxxv. nos. 409–420 (1933).

"A Botanical Expedition to Newfoundland and Southern Labrador," Rhodora, xiii. 109–162 (1911).

U. vulgaris var. *americana* A. Gray is attributed only to North America. However, this supposed variety is scarcely, if at all, separable from true *vulgaris*. The difference, a more slender and rather acute spur on the flower of var. *americana*, seems not to be sufficiently constant nor of sufficient magnitude to justify varietal rank.

U. neglecta Lehm. or, perhaps more wisely, *U. vulgaris* var. *neglecta* (Lehm.) Cosson & Germain is a very close, slender relative of *U. vulgaris*, and it occupies a region with it in Europe. It very often or usually bears well developed branching rhizoid-like shoots extending from very near or at the base of the scape. These outgrowths bear very short, thick, more or less palmate and slightly reflexed processes. On *U. vulgaris*, of this country at least, such growths are almost always diminutive or absent. However, some few forms (often slender, as are plants of *U. neglecta*) in North America bear these growths, occasionally as well developed as they are on *U. neglecta* of Europe.

Examples of *U. vulgaris* with rhizoid-like development in the United States are specimens from South Poland, Maine, collected by *Kate Furbish* in 1894, and from North Berwick, Maine, June 23, 1894, collected by *J. C. Parlin*, both in the herbarium of the New England Botanical Club; and there is pronounced growth of the sort noticeable on a collection by *Louis Williams & Rua Pierson*, no. 1333, July 23, 1933, from the Snake River bottom, Grand Teton National Park, Wyoming, elev. 6700 ft., in herbarium of Calif. Academy of Sciences at San Francisco. Another such collection is one from a muddy lagoon, Charcoal, valley of East River, Pictou Co., Nova Scotia, *Harold St. John*, no. 1450, Aug. 2, 1913, also in herb. of Calif. Acad. Sci.

The proliferations described might seem to be confined to *U. vulgaris* and its close relative, but the writer has observed, also, a case of quite elongate growth on the greatly differing species, *U. occidentalis* A. Gray, on a plant collected from Falcon Valley, Washington, by *W. N. Suksdorf*, July 28, 1883, sheets in herb. of Univ. of Calif. at Berkeley, and Dudley Herb. at Stanford Univ.

The region of Falcon Valley, in western Klickitat Co., Washington, is the type locality of the seemingly endemic *U. occidentalis* A. Gray (type coll. no. 1880 of *W. N. Suksdorf*, described in Proc. Am. Acad. xix. 95, 1883), which is similar to *U. minor* with the leaf-strewn, bladder-bearing branches, but the winter buds are not formed of obvious smooth leaves as in *U. minor*, but are composed of the hair-tufted,

scale-like foliar modifications characteristic of *U. intermedia.* Gray describes *U. occidentalis* as between these two species, and the resemblance is true of the leaves, which do range from the type of one species to that of the other, appearing as in either, as well as intermediate between the two, though more often as in *U. intermedia.* Such a combination of two different specific characters in one entity is noteworthy. *U. occidentalis* grows in a region not remote from both *U. minor* and *U. intermedia.*

A group of related species includes *U. intermedia* Hayne, *U. ochroleuca* A. Hartm., *U. minor* L., and *U. occidentalis.* The leaves, or at least what appear superficially to be leaves, of this group are typically three-parted at the base and flattened, as opposed to the leaves of the wholly differing group to which *U. vulgaris* belongs, which are parted twice basally, terete, and uniquely pseudo-pinnate. Both of these lesser groups are of a circumboreal distribution, however.

U. intermedia and its relatives bear bladders, not equally distributed upon all mature leaves as does *U. vulgaris,* but somewhat localized. Bladders are more or less present throughout the whole plant of *U. minor,* but, to an extent, in this species, and much more so in *U. occidentalis* and *U. ochroleuca,* are they abundant only on specialized branches bearing diminutive leaves. In *U. intermedia* there is a specialization of the characteristically larger bladder-bearing branches without leaves, whereas upon the foliar stalks there grow no bladders at all. The last is a well known species in shallow pools of bog-water and margins of boggy ponds and sloughs about the boreal portion of the earth.

In North America *U. intermedia* is distributed from the west coast of Greenland and from Newfoundland south to New Jersey and Pennsylvania, west, in the north, at least to British Columbia, and in the south, ranging west to Indiana, Illinois, Iowa, and further west only at higher altitudes to the Pacific States.

This distribution is of interest geographically in its relation to glaciated areas. As the species occupies boggy country of the northeastern, northern, and highland regions just outlined, it is, therefore, restricted to areas more or less glaciated during the Wisconsin period of ice-cap formation.

U. minor, though not by any means strictly a plant of bogs, has a similar geographical range in North America, from Disko, west coast of Greenland (specimen delicate and somewhat atypical, Gray

Herbarium) and from Blanc Sablon, Straits of Belle Isle, Labrador south through Newfoundland, St. Pierre et Miquelon, Magdalen Islands, Anticosti, Gaspé, Prince Edward Island and Nova Scotia, south inland through all of New England to western New York, and on the coast to Long Island and New Jersey, and west, in the north to the Mackenzie Basin (*H. M. Raup*, no. 3138), and at least to British Columbia, and in the south, growing west to the region of the Great Lakes, then locally at higher altitudes to the Pacific States. It is also in northern Asia and generally throughout Europe.

The range, at least in North America, with some local exceptions in the Northeast, covers partially glaciated areas. *U. vulgaris*, covering the same range, occupies, besides, the central plains and extends much further southward.

In Europe a species related to *U. minor*, called *U. Bremii* Heer, is recognized. This surely seems, from study of a number of specimens and from description, to be *U. minor* or, at best, no more than a variety of it, to which it was first relegated by Franchet. Morphological differences do not stand out.

Near *U. intermedia* is a species, *U. ochroleuca* A. Hartm., which bears leaves with acuminate rather than blunt and mucronate divisions, as does *U. intermedia*. Furthermore, the bladder-bearing branches may have a few leaves, a condition not true of its relative. In the Gray Herbarium at Harvard University one finds *U. ochroleuca* represented from East Prussia and locally southward through the rest of Germany. It has been considered an Old World species. Thus it is noteworthy that *Perry & Roscoe*, on July 23, 1929, collected *U. ochroleuca* at Lena Lake, St. Paul I., Nova Scotia. Collections are in the Gray Herbarium as follows: *Perry & Roscoe*, no. 351 a, July 23, 1929, and no. 351, Aug. 10, 1929.

So much for the circumboreal group, and now to turn to those of more southerly, and, individually, rather more limited distributions.

Among the Utricularias of the groups especially occupying the Atlantic coastal plain of America are a number of terrestrial species usually growing in wet sand or peat, but also among the plants of this distribution are many aquatic species, the northeastern American members of which are *U. purpurea* Walt., *U. inflata* Walt., *U. inflata* var. *minor* Chapm., *U. gibba* L., *U. biflora* Lam., *U. fibrosa* Walt., and *U. geminiscapa* Benj. These obviously do not comprise a homogeneous group morphologically, but merely share a generally similar geographical range.

Among all the species in North America *U. purpurea* is unique. The leaves are whorled. The winter bud is a thickened end of a stem bearing abbreviated, incurled, and uniquely remote leaves, whereas specialized buds of other species are more or less rounded masses of closely imbricated leaves or leaflike scales upon a very short axis.

U. purpurea Walt. is common in ponds and sluggish, but generally not extremely shallow water. It occupies a wide range north and south, recently found to be more extensive than formerly known: Montreal Co., Quebec, south through Nova Scotia and New Brunswick and the Atlantic coastal states to Florida; Mississippi, Louisiana; northern Indiana and Michigan to Minnesota; Cuba; British Honduras.

In Montreal Co., Quebec it grows near the city of Montreal, and therefore in the low valley proper of the St. Lawrence, as is to be expected of a generally coastal plain plant extending northward. The isolated representation from British Honduras was collected at All Pines by *W. A. Schipp*, no. 608, Sept. 1, 1930, specimens observed in the Gray Herbarium and at the University of California at Berkeley.

A single relative of *U. purpurea* in the New World is *U. myriocysta* St. Hil. & Girard. Both species have whorled leaves and purple flowers. In the Gray Herbarium *U. myriocysta* is represented only from British Guiana.

U. inflata Walt. and its var. *minor* Chapm. are recognizable by the single whorl of inflated, petiole-like processes radiating from the base of the flowering scape which usually appears annually. The leaves are not whorled, but arranged as are those of most aquatic species. Var. *minor* Chapm. (*U. radiata* Small) is distinguishable from typical *inflata* in that the basal divisions of the leaf are longer and much more slender throughout the plant (for comparative measurements see key), in the generally shorter, fewer-flowered scapes, and in the smaller size of the plant and all its parts.

It is noticeable, then, that all the many collections of *U. inflata* from the northeastern United States are not of typical *U. inflata*, as is most often supposed, but are of Chapman's variety *minor*.

Typical *U. inflata* is a plant of the Southern States only. It has been collected from quiet water on the southern Atlantic coastal plain and the lower Mississippi Valley region, which is known to be a related area botanically. From Florida it is represented from Duval, Volusia, Pinellas, Lee, and Brevard Counties, from Screven Co., Georgia, and locally from South Carolina. There is one record as far north as

Grassfield, Norfolk Co., southeastern Virginia, *Fernald & Griscom*, no. 4501, May 7, 1935, in Gray Herbarium. Collections have also been studied from Madison Co., western Tennessee, Cherokee Co., eastern Texas, and Sansaba Co., central Texas. This robust plant only occasionally intergrades with variety *minor* in the generally diagnostic foliar character mentioned and in size.

The range of var. *minor* is disrupted, it having been collected from Hancock, Waldo, and Franklin Counties of Maine, south near the coast commonly to New Jersey, then becoming very local, if not lacking, southward, reappearing in pine barrens of Duval, Lake, Brevard, and Polk Counties, Florida, and collected at least once from near the Paraguay River and Concepcion, Paraguay, and from Santarem, on the Amazon River, Brazil, by *R. Spruce*.

The strikingly isolated plants from South America have quite the appearance of *U. inflata* var. *minor* as concerns all gross morphology of herbarium specimens, at least. The collection by *R. Spruce* from Santarem was first named as a separate species, *U. quinqueradiata* Spruce ex Oliver in Journ. Linn. Soc. iv. 171 (1860). No description is there given other than the following:

"No. 1053 *U. quinqueradiata* (Spruce's MSS.). Santarem.—I regard this as a small form of the *U. inflata*, Walt., of the North American continent. Specimens from Florida (Rugel, coll.), labelled *U. inflata*, var. *minor*, do not seem different."

There is no reason to doubt this statement, despite geographical separation; the plants of both continents are probably the same.

It is of interest that at least one other species, *U. stellaris* L., bears inflated petiolar growths as does *U. inflata*, though it differs in the sacs being shorter and all the leaves being whorled. This plant is represented in the Gray Herbarium from the valleys of the Nile, Congo, and Niger Rivers of Africa, and from Malabar on the southeast coast of India, and is known to grow elsewhere in both Africa and India.

A North American coastal plain dispersal of quite expanded sort northward is to be found in the range of *U. geminiscapa* Benj. (*U. clandestina* Nutt.). *U. geminiscapa*, with its delicate leaves of rounded outline and twin bases and its commonly occurring cleistogamous and fruiting flowers, is frequent in ponds and bog-pools of the northeastern coastal plain and related or adjacent areas: western Newfoundland; Magdalen Islands of Quebec; Nova Scotia; Hancock and Waldo

Counties, Maine, south chiefly near the coast to Delaware and Pennsylvania. A quite isolated southern locality is represented by the collection of *Fernald & Long*, no. 4187, July 28 and 29, 1934, from Cape Henry, Princess Anne Co., southeastern, Virginia. The species grows isolated inland in Orleans Co., Vermont, and it occurs in a sandy region of the Connecticut Valley in Hampden and Berkshire Counties of western Massachusetts. Vilas Co., Wisconsin is another noteworthy isolated area represented.

Other coastal plain plants, including *Utricularia gibba*, are commonly reported from this region of the Connecticut Valley of Massachusetts; and to find coastal plain affinities in the southern Great Lakes region is, of course, an old story, but an ever expanding one as regards the generally coastal Utricularias of that area.

Similarly, such plants as *U. geminiscapa* may extend to the northeast not only via Cape Cod and Nova Scotia, and even to western Newfoundland, as Prof. Fernald points out, but may, as is known, even follow the inner coast, that is, of Maine, more remote from the eastwardly sunken coastal plain. *Chamaecyparis thyoides* grows more and more locally eastward on the coast to York Co., Maine, reappearing in Waldo and Knox Counties, whereas some other similarly distributed plants meet the boreal types as far east as Mt. Desert Island. It is of interest, but not surprising, then, that Utricularias of the expanded coastal plain dispersal should be common in these many named areas outside the true Atlantic coastal plain.

Though *U. geminiscapa* does not seem to have been collected from British Honduras, a very similar plant, but with "flowers deep rose colour" instead of yellow was collected by *W. A. Schipp* at All Pines, British Honduras, no. S 90, Sept. 2, 1930, in herbarium of Univ. of Calif. at Berkeley. It was at All Pines that Schipp collected the northern coastal *U. purpurea* cited above.

U. gibba L. is a fine example, in its distribution, of the coastal plain groups. It is not restricted to the coast, but much commoner near it, known from Megantic Co., Quebec, Lunenburg and Yarmouth Counties, Nova Scotia, and Maine, south to Florida and west to Louisiana, near the Gulf Coast, also Ouachita Parish, valley of Washita River, northern Louisiana; isolated in western Vermont, Hampden and Berkshire Counties of the Connecticut Valley in western Massachusetts, and western lowland New York to southern Ontario, Michigan, Wisconsin, Ohio, Indiana, Illinois, and, according to Gray's Man.,

7th ed., in Minnesota (specimens not observed from Minn.). Isolated collections come from Tennessee, and from Tarrant Co., northern Texas, and specimens probably of this species have been observed from elsewhere in Texas and north into Oklahoma. *U. gibba* is also in California. Plants seemingly of this species appear from the Bahamas, Porto Rico, Mexico, and, again, British Honduras.

The generally once-dichotomous, very delicate leaves of but one type, with many bladders, especially near ends of leaves, as characteristics serve fairly well to distinguish the vegetative plants of *U. gibba* from other North American species, and when it is in flower, as is frequent, the noticeably small, laterally flaring corollas further decide determination.

It is noteworthy that just such specimens as described above of this once supposed eastern coastal plant appear in collections from California, most of them properly identified as *U. gibba*. At least, complete morphological characters observed in pressed material (and some fresh) point definitely to that species. H. L. Mason published an article on the occurrence of *U. gibba* in California in Madroño, ii. p. 23 (1931), and I find that most of the following citations of collections observed by the writer were first noted by Dr. Mason in his article. Citations of sheets studied are as follows: Bogg's Lake, Mt. Hannah, 2500 ft., Lake Co., *J. W. Blankinship*, Sept. 10, 1928, in herb. Calif. Acad. Sci.; slough at Holt, San Joaquin Co., *John Thomas Howell*, no. 4411, Sept. 21, 1929, in herb. Calif. Acad. Sci.; irrigation ditch, Stockton, San Joaquin Co., *Walton Clark*, Aug. 26, 1923, in herb. Calif. Acad. Sci.; ditch 3 mi. southeast of Santa Rosa, Sonoma Co., *M. S. Baker*, Nov., 1898, in herb. Univ. Calif. at Berkeley; Swamp Lake, 5200 ft., Tuolumne Co., *H. L. Mason*, no. 11593, July 23, 1937 (aquatic form with no flowers, and emersed form from floating log), bearing flowers in herb. Univ. Calif. at Berkeley. Thus a marked addition to the once supposed range was brought to light.

U. biflora Lam. and *U. fibrosa* Walt. are close to each other and both in the *U. gibba* relationship according to appearances. *U. fibrosa* seems characteristically to bear several purely vegetative branches crowded with comparatively large leaves which are nearly all three times dichotomous and supporting very few or no bladders. *U. biflora* differs vegetatively from *U. fibrosa* in seemingly not having these specialized vegetative branches. The fully developed leaves of *U. biflora* (and those of unspecialized branches of *U. fibrosa*) are some-

what larger than those of *U. gibba* and are twice dichotomous, whereas leaves of *U. gibba* are once dichotomous, rarely with an abbreviated third division. The flowers of *U. gibba* are distinctly smaller than those of *U. fibrosa* and than almost if not quite all those of *U. biflora*, and the spur of *U. gibba* is distinctly shorter than that of the two relatives.

The geographical distributions of *U. fibrosa* and *U. biflora* are very similar but cover only a portion of the range of *U. gibba*, being restricted, at least northward, to the coastal plain area itself, extending locally in ponds north only to southeastern Massachusetts, along with a number of better known but similarly restricted plants. Judging only from well collected sheets, *U. biflora* is represented from Barnstable Co., Massachusetts south near the coast to Florida; Mississippi to Texas and north into Oklahoma; also probably south of the United States.

U. fibrosa reveals records from certain ponds of Plymouth, as well as Barnstable Counties, Massachusetts; Long Island, New York, and New Jersey, south, probably locally, to Florida; Alabama and Mississippi; also possibly south of the United States.

Subtropical and tropical Utricularias of the *gibba-biflora* relationship grow in parts of the West Indies, Mexico, Central and South America. These include imperfectly known species, more or less similar to each other and to *U. gibba* or to *U. biflora*. Due to few and incomplete specimens final statements of the taxonomic or local geographic situations concerning these seem at present to be impossible. And, eventually, careful synoptical work will be necessary on the group from the southern United States southward.

It seems probable that species of this relationship, but not discussed here, extend northward as a subtropical complex into the Gulf States and possibly westward in the lower valleys. But probably *U. gibba*, *U. biflora*, and *U. fibrosa* are the only species of such a relationship to be found in the area covered by Gray's Manual.

Because it is well outside the Manual range a certain whole group of strikingly distinct aquatic Utricularias, those of the *U. oligosperma* relationship, extending north to peninsular Florida and the Gulf Coast, has been here omitted from consideration. One species is known from southern Florida to Louisiana. These aquatics are large plants with excessively ramified, elongate, bladderless leaves and elaborate, specialized, leaflike branches dispersed among them (and

not at their bases) and bearing many bladders. Such a form of plant is outwardly similar to no other group of the genus.

Finally, a discussion might be devoted to qualities of the habitat of North American Utricularias. All species of the Atlantic coastal plain dispersal grow in what would seem to be only acidic waters or soils, usually in sandy and boggy localities.

U. gibba, *U. biflora* and *U. fibrosa*, of peaty or somewhat sandy pondshores, nearly bridge, in habitats, the aquatic with the truly terrestrial species. *U. biflora* commonly becomes stranded or nearly so, and when in this condition will develop pale branches just beneath the mud, somewhat as does *U. cornuta* of boggy or wet sandy ground, save that the leaves on such branches are not the erect, slightly emerging, and simple leaves of *U. cornuta*, but are, in form, essentially like the usual ones of *U. biflora*, being merely reduced in size. Bladders are always borne on such leaves, and the appearance of these branches is much like certain similar growths more common to *U. minor*.

Upon becoming stranded in late summer, flowering of these three species is usual. *U. gibba*, though often growing in tangles or rafts fairly well off shore (as well as very near shore), fully as commonly as *U. biflora* becomes stranded also; and it can grow, it would seem, to better advantage thus than *U. biflora*. Flowering usually becomes profuse. The few radiating stems subtending a scape will dry up, yet the plant persists with the habit of, say, the terrestrial *U. resupinata*. *U. gibba*, especially, may be found in either aquatic, and then usually vegetative, condition or in terrestrial and fruiting phase, and the habit may be in all stages between the two forms according to environment, yet obviously the same species. The neighboring Myriophyllums behave quite similarly.

Among the circumboreal species there is no general preference toward acidic or basic waters. *U. vulgaris* is common in all circumneutral or somewhat acidic waters of its range, and some specimens from the Great Plains and the Southwest are encrusted with alkaline deposit.

U. minor, however, despite possible and seeming exceptions, shows preference for basic waters, often growing in ponds washing a calcareous bed. And, as local New England collectors can testify, *U. minor* may even grow in alkaline tidal inlets, such as Winnegance Creek, Phippsburg, Sagadahoc Co., Maine, and creeks at Falmouth, Massachusetts, in which cases growth is variously and oddly modified. (See herb. New England Bot. Club.)

The writer has most commonly found *U. minor* in water proximate to more or less calcareous rock, yet he has also found it in the open, deeper places and thoroughfares through sphagnous bogs, generally supposed to be an acidic habitat by field botanists. Such a habitat is to be found in the deeper, open water of the thoroughfare through Knights Bog, foot of Pitcher Pond, Northport, Waldo Co., Maine. Nearby, *U. intermedia* and *U. geminiscapa* grow in the bog-bound, shallow pools not occupied by *U. minor.*

In one instance noted by the writer *U. minor* grew in water of a deep bog, and was near *Sphagnum, Chamaedaphne,* etc., but in close company with *Nitella.* This was on the bottom, not the shallow sphagnous margin, of a spring-fed pool (near Beaver Pond, Lincoln, Massachusetts). *U. minor,* however, in no case grew in the smaller, stagnant pools intimately surrounded by the acid-loving and acid-creating *Sphagnum,* as is often the case with the similar *U. intermedia,* and true, as well, of the quite differing *U. geminiscapa.* The pool in question being rather deep and partially fed by an underground flow might well have had both basic and acidic habitats for plants, the basic tending to dominate below. This condition, as a guess, may also have been true in the case of *U. minor* growing in the deep center of the slough in a sphagnous bog.

U. intermedia generally occupies acidic water throughout its range in this country, and yet, occasionally, it is collected from a marl bog: "In marl, edge of Meadow Lake," valley of the Limestone River, Fort Fairfield, Aroostook Co., Maine, *M. L. Fernald,* 1898, Gray Herb. To certain other such seeming aberrancies in Aroostook County Prof. Fernald has already called attention.

But the water, altogether testing as acidic or basic either, of course constitutes no absolute or accurate indication of the actual chemicals needed and used by plants growing therein. Physiological study of chemical requirements for certain Utricularias might explain the seemingly unusual habitats.

Stanford University
California.

Explanation of Figures

Utricularia purpurea: fig. 1, a whorl of leaves on stem, showing only the bases of two of the divisions; fig. 14, winter bud, showing fleshy winter-resistant portion with its incurled leaves.
U. biflora: fig. 2, portion of stem bearing leaves.
U. gibba: fig. 3, portion of stem bearing leaves.

U. FIBROSA: FIG. 4, specialized vegetative branch.
U. GEMINISCAPA: FIG. 5 a, a leaf; FIG. 5 b, a cleistogamous fruit (split open by pressure); FIG. 16, winter bud.
U. VULGARIS: FIG. 6, a leaf, showing only the base of one half; FIG. 12 a, winter bud; FIG. 12 b, foliar modification from winter bud, × 5.
U. INFLATA: FIG. 7, a leaf.
U. INFLATA, var. MINOR: FIG. 8, a leaf.
U. MINOR: FIGS. 9 a & b, portions of stems from two plants showing two common forms of 3-parted leaves; FIG. 9 c, portion of stem bearing two 3-parted leaves of the less frequent, short, broad and bladderless form, especially of vernal growth from winter buds or of nearly terrestrial plants; FIG. 15, winter bud, with the usually somewhat incurved subtending leaves.
U. INTERMEDIA: FIG. 10 a, portion of stem bearing the 3-parted leaves; FIG. 10 b, apex of a terminal foliar division, × 5; FIG. 10 c, specialized bladder-bearing branch; FIG. 13, winter bud; FIG. 13 b, foliar modification from winter bud, × 5.
U. OCHROLEUCA: FIG. 11 a, portion of stem bearing leaves; FIG. 11 b, apex of a terminal foliar division, × 5; FIG. 11 c, bladder-bearing branch.
All figures natural size unless otherwise indicated.

SOME RECENT ADDITIONS TO THE FLORA OF BERKSHIRE COUNTY, MASSACHUSETTS

GEORGE J. WALLACE

In spite of the thirty years of exploration and research that is back of Hoffman's admirable *Flora of Berkshire County*,[1] a census of the flowering plants occurring at the Pleasant Valley Bird and Wild Flower Sanctuary in Lenox during the spring and summer of 1938 disclosed additional species that seem well worth recording. But for two interesting exceptions, these new species, as might be expected, consist of exotics, presumably introduced since the publication of Hoffman's work. Mention should also be made of several other plants which, though known in the region before, have changed their status markedly in the last decade or two.

Census work was confined to the Sanctuary grounds, a 306-acre tract of land comprising old meadows, marshes, alder swamps, and the deep cool woods of a mountainside. The whole area ranges in elevation from 1200 feet in the valley of the included trout stream to 1800 feet at the summit of Lenox Mountain. To the wealth of plant species naturally occurring in such a diversity of habitat may be added many deliberate as well as accidental introductions—bog species in the artificial bog, woodland plants in the Fernery, berry-producing shrubs planted to encourage birds, and a great number of unforeseen

[1] Hoffman, Ralph, *Flora of Berkshire County, Massachusetts*. Proc. Boston Soc. Nat. Hist. Vol. 36, No. 5, 1922, pp. 171–382.

associates that seem to spring up whenever transplantations are made. Offsetting these advantages, as far as the number of species listed is concerned, are the facts that the area involved is essentially a plateau lacking the virtually hundreds of plants indigenous in the lower river valleys; that the area has not been under cultivation for many years, thus eliminating many weed species; and that the census work was confined to a single season (by a single person with many other duties), so that many difficult groups, such as grasses and sedges, were only partially worked out.

A total of 525 species of Spermatophytes were listed for the season. Additional varieties of course occur, but are not included in this number. The following are believed to be either new for the county, or else to exhibit a marked extension of the range formerly accorded them.

Serapias Helleborine L. Though not strictly a recent addition to the local flora, the present widespread distribution of this formerly rare orchid merits its inclusion here. The small colony originally discovered in Stockbridge in 1898 by Miss Caroline Wells was destroyed at an early date and the plant remained unknown in Western Massachusetts until rediscovered in 1931 by nature teachers at Camp Sumner. Since then the lost orchid has come into prominence and its occurrence has been noted in quite a number of localities. It seems thoroughly at home in the woods at the Sanctuary, several dozen widely scattered specimens having been found during the summer of 1938. There is no record of its deliberate introduction by planting. Considering its European origin it is perhaps not surprising to see this introduced form spreading more rapidly than our native species.

Pimpinella Saxifraga L. There appears to be no previous record of the occurrence of this species in Berkshire County, although from the range accorded it in Gray's Manual there is no particular reason why it should not be found. From late July until mid-September scattered specimens of this European parsley appeared in bloom, appropriately enough, on the Sanctuary's Nature Trail, in an open portion planted several years ago to young spruces, and thus possibly explaining the source of seed. It extended over several square rods of territory, a delicately pretty, but not very conspicuous plant, its superficial similarity to several other white parsleys perhaps preventing its earlier detection both here and elsewhere.

Monarda fistulosa L. It is a little surprising to find in connection with this species that Hoffman mentions only the variety *rubra*, found near a dwelling in Lanesboro. At the Sanctuary the type, not the variety, is among the most common and conspicuous of our late summer wild flowers, blooming for nearly two months. Its identifi-

cation is perhaps more frequently the subject of inquiry than any other plant on the grounds, this fact among others suggesting that it may have been introduced recently. Though native to this country, its presence in the Berkshires must have some other explanation. It grows abundantly in old fields, thickets, along the roadside, and the margins of the Sanctuary Pond, in either moist or dry soil.

Veronica Chamaedrys L. This species, originally naturalized from Europe in a few places, has likewise probably recently invaded the Berkshires, the first specimens noted appearing on the edge of the Sanctuary lawn in May 1938. Verbal reports of its occurrence in other near-by areas have come to my attention, but only the specimens at the Sanctuary have been personally verified. A similar species, *Veronica Tournefortii* C. C. Gmel., listed by Hoffman for Lanesboro and Pittsfield, also appeared here, in 1937, as a weed in a rock garden; but it did not reappear the following year until November when a luxuriant clump bravely bloomed just in advance of a heavy snowstorm. It still retained some of its petals when the snows disappeared during a December thaw.

Plantago virginica L. The unexpected occurrence of this species, known heretofore, in New England, only from a few coastal regions, has been reported in a previous number of this journal.[1] About a dozen specimens were located along a sandy portion of the shores of the Sanctuary Pond.

Helianthus grosseserratus Martens. Perhaps the most interesting of the new species found at the Sanctuary in 1938 is this native sunflower, apparently not previously reported for this county, although it is well within the range of the species. Some two dozen or more specimens were found growing among the tall goldenrods of a waste acre or two, the sunflowers, for the most part, towering above the tallest of the associated weeds.

Hieracium florentinum All. It may be of interest to mention the local spread of this European Hawkweed. Recorded in Gray's Manual as naturalized from eastern Quebec to Northern New York, and mentioned by Hoffman as adventive in Egremont, Massachusetts, it now appears to be a frequent field and roadside weed. A nearly identical species, *Hieracium floribundum* Wimm. & Grab., not listed by Hoffman, is also believed to occur, but unfortunately its specific distinctness was not satisfactorily verified at the time it was noted.

Pleasant Valley Bird and Wild Life Sanctuary,
Lenox, Massachusetts

[1] Rhodora **40**: 424, 1938.

THE STATUS AND DISTRIBUTION OF CYPERUS DISTINCTUS STEUD.

Hugh T. O'Neill

Torrey (Ann. Lyc. N. Y. **3**: 275–76. 1836) describes under *Cyperus vegetus* Willd.? (the interrogation point is Torrey's) a plant with "nut lanceolate, attenuated to a long point, tumid at the base" and concludes with "This species greatly resembles *C. virens*, but it can be distinguished by its smooth, obtusely triangular culm, and long-pointed nut with a remarkably cellular bulbous base. It is probable that our plant is a distinct species from *C. vegetus* of Vahl and Willdenow."

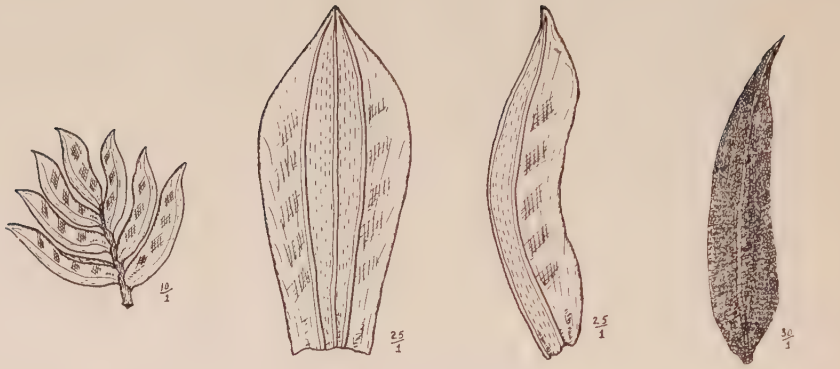
Steudel (Syn. Pl. Cyp. 24. 1855) describes this same plant as: "achenio lanceolato longe acuminato-attenuato, basi sub-bulboso tumidulo" and gives the range as "Carolina Florida Georgia" in accord with Torrey. He very appropriately named this plant *C. distinctus* and distinguished it clearly from *C. vegetus* Willd. and his own *C. pseudovegetus*. *C. distinctus* has a large mass of spongy parenchyma at the base of the achene (the torulose base or spongy hypogynium). This feature is constantly present on all mature achenes. It is entirely wanting in *C. vegetus* and *C. pseudovegetus*. Curiously, while American authors took up the less distinct *C. pseudovegetus*, the much more clean-cut *C. distinctus* never found its way into American literature. It is not mentioned, even as a synonym, in Chapman's Flora of the Southern States (1860, 1883, 1897) nor in Small's Flora of the Southeastern United States (1903, 1913) and Manual (1933). Patterson's Check-list (1892) and Heller's Catalogue, 2nd edition (1900), merely mention *C. distinctus*.

Only one other species of *Cyperus* in the United States has achenes torulose at the base, *C. oxylepis* Nees, recently reported from this country (O'Neill. Rhodora **40**: 358. 1938). This peculiar hypogynial structure is very much less developed in *C. oxylepis* than in *C. distinctus*.

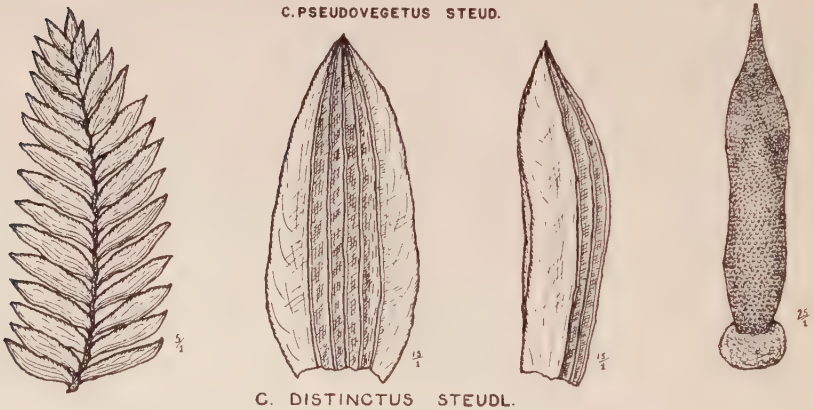
Kükenthal (Pflanzenreich 4^{20}: 178. 1935–36) recognizes *C. distinctus* but cites only one specimen.

These three species may be recognized by means of the following key:

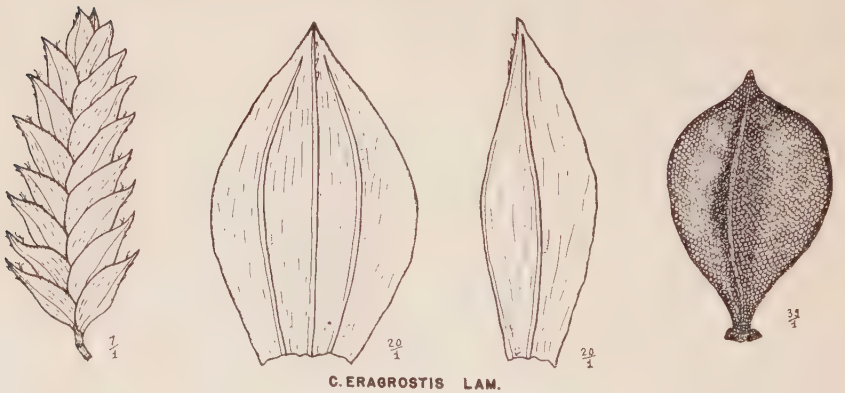
1. Base of achene conspicuously torulose, about 0.35 mm. wide, 0.2 mm. long, body of achene linear-oblong, 1.0–1.2 mm. long, 0.2–0.3 mm. wide, its beak an additional 0.5 mm. long. Spikelets 6–14 mm. long ..... *C. distinctus* Steud.
   Base of achene not at all torulose ..... 2.



C. PSEUDOVEGETUS STEUD.



C. DISTINCTUS STEUDL.



C. ERAGROSTIS LAM.

2. Spikelets 2.5–4.0 mm. long; glumes 1.6–2.0 mm. wide, not falcate; style about 1.0 mm. long; stigma about 1.0 mm. long; achene obovoid, 0.6 mm. wide, straight.
(*C. vegetus* Willd.) = *C. Eragrostis* Lam.
Spikelets 10–20 mm. long; glumes 0.8–1.0 mm. wide, falcate; style about 0.5 mm. long; stigmas about 0.5 mm. long; achene linear, 0.25 mm. wide, falcate ..... *C. pseudovegetus* Steud.

The accompanying figure further illustrate these specific differences.

Although Torrey cites a specimen from North Carolina, I have been unable to find this specimen and have found no subsequent collection from this state. The range of this species appears to be South Carolina, Georgia, peninsular Florida and the Bahamas, i.e. the southeastern coastal plain and the Bahamas. A list of specimens studied follows:

South Carolina: *Gibbes*, Charleston. Georgia: *Pyron and McVaugh*, St. Simon Island. Florida: *Curtiss*, Indian River, 3062, 5238; *Eaton*, Miami River, 302; *Garber*, Miami; *Hitchcock*, Marion County, 2103, 2105, 2106, 385; *Fredholm* 6184; *Harshberger*, Lake Okeechobee; *LeRoy* sine loc.; *Lighthipe*, Duval County; *Lovett* 179; *Moldenke*, Pompano, Jacksonville, 5254; *O'Neill* 5263, 7629, 7460; *Williamson*, Jacksonville; *Donnell-Smith*, Tampa; *McAtee* 1691; *Standley* 12620, 19026; *Francis* 26. Bahamas Islands: *Britton and Brace* 485, Southwest Bay.

The range of *C. pseudovegetus* is northern Florida to Texas and north to Kansas, southern Indiana, southern Illinois, Kentucky, Maryland and southern New Jersey. *C. Eragrostis* is confined to Oregon and California in this country. It occurs as a fugitive in the eastern states, France, New Zealand, etc.

Langlois Herbarium,
Catholic University of America

NOTES ON NEW ENGLAND ALGAE I: CYCLONEXIS AND ACTIDESMIUM[1]

R. M. Whelden

Among the algae there are many species which are considered extremely rare. One of these is *Cyclonexis*, which Stokes (4) found in New Jersey occurring among Sphagnum plants and described in 1886

[1] Contribution from the Laboratories of Cryptogamic Botany and the Farlow Herbarium, Harvard University. No. 166.

on the single species *Cyclonexis annularis*. In this country it was subsequently recorded by Tiffany (5) in 1934 as occurring in a fish hatchery at the west end of Lake Erie.

In Europe the occurrence of the alga has been recorded twice, first in England by Grove (1) in 1920 and later in Germany by Pascher (2). In none of the records are any extensive notes concerning the alga given. The alga is placed in the family Ochromonadaceae of the Chrysophyceae, a family which includes the more commonly found genus *Dinobryon*.

Early in May (1938) Mr. E. W. Thompson, collecting algae in various ponds and streams in the vicinity of Andover, in eastern Massachusetts, found what he immediately decided was *Cyclonexis annularis* Stokes and reported it to the author. Shortly thereafter, the two of us visited the pool in which the alga had been found. This pool, formed by the partial obstruction of a small brook, is about thirty feet across and at most only a few inches deep, rather densely shaded by bushes and trees, and largely filled with several aquatic species of sedges and grasses.

On this second visit we gathered several bottles of material from various parts of the pool, collecting between two and three o'clock in the afternoon. Returning to the laboratory the writer carefully observed the material collected and could find no sign of any plant sug-

gesting *Cyclonexis*, there being found only sterile filaments of an *Oedogonium* sp., filaments of *Tribonema bombycinum*, and a small number of desmids and diatoms.

The following week we again visited the pool, at about the same time of day and gathered as before, from the same parts of the pool, in which there remained very few of the filamentous algae. On examination a few hours later, *Cyclonexis* was found present in rather large numbers, being especially abundant in the collections made by sucking up material from among the dead maple leaves in the bottom of the pool. The writer watched attentively and examined carefully a great many of the ring-shaped colonies (Fig. 1 a, b).

Most of the colonies seen were composed of from eight to twenty cells. The individual cells were 18–20 μ long and 6–10 μ in diameter at the widest part. The cells of a colony varied somewhat in diameter, but were very uniform in length. The longer of the two cilia usually extended out from the apex of the cell to a length of 20 to 25 μ, but was sometimes recurved over the outer surface of the cell (Fig. 2 b), while the shorter cilium was 6–8 μ long and nearly straight or only slightly curved. Repeated examination failed to show any indication of the spiral nature of the shorter cilium figured by Stokes and others. The plastids seem to be somewhat variable in position although most frequently they occur as two elongate parietal plates against the lateral walls of the cell. Not infrequently one occurs near the larger end of the cell and is then more or less shell- or cup-shaped.

On several occasions while a colony was being observed it was met by a small crustacean or other swimming animal. Almost always the consequences of such an encounter were fragmentation of the *Cyclonexis* colony. Sometimes it merely broke in two, each of the halves then bending together to form smaller colonies (Fig. 3 a, b). Often fragmentation resulted in unequal colonies, one being composed of only two to five cells. Many cases were observed in which single cells broke away from the colony on such occasions (Fig. 2 c, d). Twice colonies were observed to break up completely into their individual cells.

Not only does fragmentation result from chance encounters of this nature, but it also occurs when the drop of water in which the colonies are being examined begins to evaporate. The changes which occur come on very gradually. One first notices that the cells of the colony begin to swell so that they push each other apart, the colony becoming

three or more times as large as normal (Fig. 4). As swelling increases the activity of the colony decreases and finally ceases. If fresh water is added the colony takes on renewed activity, but usually only for a short time before the cells break apart and swim about independently and quite actively. If drying is allowed to continue, or if the water in which the colonies occur is kept in closed containers, the colonies invariably enlarge greatly and then the cells burst, there being left the most inconspicuous trace of fine particles and no sign of any cell wall. Just before this bursting occurs the cells become badly distorted and irregular.

All attempts to preserve specimens of this alga failed. The invariable result of contact with the many preservatives used was complete disintegration of the colonies and bursting of the cells.

While examining the material from this pool, the writer's attention was drawn to another alga which was present in considerable numbers. This was *Actidesmium Hookeri* Reinsch, another infrequently encountered green alga. This alga is considered by algologists to be a member of the Characiaceae, a family of the order Chlorococcales of the Chlorophyceae. In this country one species has been recorded from California by Smith (3). This species has been reported several times in Europe, where a second species, *Actidesmium globosum*, has also been found.

In the present collection, specimens of *Actidesmium* are quite numerous, occurring among various filamentous algae. The colonies vary considerably in size and in the number of cells, which ranges from small specimens containing only two groups of four and five cells each, to large colonies composed of twenty or more groups, each containing five to eight (or more) cells. (Fig. 5–7).

The cells vary greatly in size and shape. In the majority of the specimens examined, the cells are spindle-shaped objects 17–20 μ long and 4–10 μ in diameter, long, acute, pointed at the attached end and bluntly rounded at the free end. In other specimens the cells are more nearly globose and 12–15 μ in diameter. Several cases were observed in which early stages of zoospore formation existed (Fig. 6).

In view of the apparent rarity of the algae herein mentioned it seems worthwhile to note their occurrence in this locality. It may be that they are of more common occurrence than is supposed, but are not found because examination of the material collected is postponed until too late to observe them.

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(3). Smith, G. W.—Freshwater Algae. (1933).
(4). Stokes, A. C.—Notes on new freshwater Infusoria. Proc. American Phil. Society **23:** Infusoria (1886). pp. 562–568.
(5). Tiffany, L. H.—The Plankton Algae of the West End of Lake Erie. Franz Theodore Stone Lab. Contr. No. 6 (1934) 1–113. 15 pl.

Description of Figures

Figures 1–4. Cyclonexis annularis Stokes. 1 a, b. Vertical and lateral aspects of normal colony, 2 a–e; fragments of colonies which have been repeatedly "attacked" by small animals. 3 a, b. Reduced colonies re-forming after a normal colony has been broken by encounters with animals. 4. A small colony in which the cells are enlarging as drying occurs.

Figures 5–7. Actidesmium Hookeri Reinsch.

Figures 1, 5, 6, & 7 are drawn to scale a; 2, 3, 4 to scale b.

A Station for Cheilanthes alabamensis in Giles County, Virginia.—On July 8, 1938, while collecting with my class from the Mountain Lake Biological Station along the New River, in Giles County, Virginia, I came upon several plants of the Smooth Lipfern, *Cheilanthes alabamensis* (Buckley) Kunze.

The range of this species is usually given as Virginia and Missouri to Alabama, Arizona and Mexico. Its occurrence in Virginia has been based solely upon collections made many years ago in Lee County, where it is said not to have been found recently. Some doubt has been expressed as to whether the plant still exists at this locality. Dr. E. T. Wherry tells me that during the summer of 1938 he spent an entire day in a diligent but fruitless attempt to relocate it on the cliffs of the Powell River in Lee County, where it is believed that the original Virginia specimens were collected. If *Cheilanthes alabamensis* no longer grows in Lee County then the locality here reported may well be the only one now known within the state. At least, it represents a range extension to the east-northeast of about 140 miles.

The present find was made on the calcareous bluffs along the east bank of the New River, about a mile and a quarter north of the town of Ripplemead or one-half mile northwest of the railroad station at Klotz. Here, high up near the crest of the cliffs overlooking the river

and some extensive limestone quarries, the fern was discovered, growing on the perfectly bare cliff-face.

The flora of these cliffs is indeed an interesting one. Associated with the *Cheilanthes* on the bare rock ledges are two other lime-loving ferns, *Asplenium cryptolepis* Fernald and *Pellaea glabella* Mett. The predominant herbaceous vegetation includes *Draba ramosissima* Desv., *Sedum Nevii* Gray, *Brachychaeta sphaeclata* (Raf.) Britton, *Aster oblongifolius* Nutt., *Rudbeckia triloba* L., *Polymnia canadensis* L. and *P. uvedalia* L.—all pronounced calciphiles. The characteristic tree on the summit of the bluffs is *Quercus Muhlenbergii* Engelm.; and a trio of shrubs to be looked for on all such calcareous formations throughout this area (*Rhus canadensis* Marsh., *Ptelea trifoliata* L. and *Zanthoxylum americanum* Mill.) is here present. This entire assemblage of species, to which many more might be added, is so characteristic a feature of almost every calcareous bluff along the New River as to engender the hope that further careful exploration of similar habitats may yield additional stations for *Cheilanthes alabamensis* in this and adjacent counties.

Specimens of the present collection (Fogg No. 14861) are being deposited in the Gray Herbarium and the herbaria of the University of Pennsylvania and of the Mountain Lake Biological Station.—John M. Fogg, Jr., University of Pennsylvania.

Spiranthes michuacana in Arizona.—Recently, while working up the *Spiranthinae* of Mexico for an orchid flora of that country, a specimen of *Spiranthes michuacana* (La Llave & Lexarza) Hemsley from Arizona was found among the undetermined specimens in the Gray Herbarium. The species does not seem to have been reported previously from the United States although it is not surprising to find it in Arizona. The plant ranges from the states of Oaxaca, Guerrero and Puebla to Sonora and Chihuahua in Mexico with its northern limit in Arizona.

Arizona: Hermitage of Rucker Valley, September 1881, *Lemmon 477*.

The same collection in the Kew Herbarium has the locality as "Huachuca Mountains."—Louis O. Williams, Harvard University.

Certain Plant Records from Hillsboro, New Hampshire; a Correction.—By some accident, an only partially corrected galley of

Dr. Blake's and my article with the above title was sent to the printer; and, because of absence from Cambridge, I did not see the final proof. In consequence, two alterations which should have been made were omitted from the paper as it appeared in RHODORA for January, 1939. They are as follows.

Dr. Baldwin has expressed doubt as to the accuracy of the data of collection accompanying certain specimens. Accordingly, the sentence on page 35 reading, " . . . the list and the herbarium contain the following authentic records . . . " should read, " . . . the list and the herbarium contain the following apparently authentic records . . . "

The author-citation for *Ampelopsis brevipedunculata*, also on page 35, should be (Maxim.) Trautv., not Koehne as published.—C. A. WEATHERBY.

OXYPOLIS **Canbyi** (Coult. & Rose), comb. nov. *O. filiformis canbyi* Coult. & Rose in Contrib. U. S. Nat. Herb. vii. 193 (1900).

The local plant of Delaware, isolated from the more southern *Oxypolis filiformis* (Walt.) Britton by the breadth of eastern Maryland, Virginia and much of North Carolina, differs not only in the remarkably distinct fruit, pointed out by Coulter & Rose, but in the much less developed stipular sheaths of the more delicate leaves. In *O. filiformis* the quill-like lower leaves are 3–6 dm. long, with sheathing bases 0.5–1.8 dm. long; in *O. Canbyi* the lowest and very slender leaves are 1–2 dm. long, with dilated sheaths only 0.5–1 cm. long. This marked difference in the foliage, added to the wholly different fruit, clearly separates the local *O. Canbyi*.—M. L. FERNALD.

THE ASTERISK IN LINNAEUS' SPECIES PLANTARUM.—Since some citations in *Species Plantarum* are followed by an asterisk, it is important to know what this sign means. The use was presumably explained by Linnaeus himself in the preface of the second edition:

> DESCRIPTIONES* tantum in obscuris adhibere necessum fuit, easque sine ambagibus, ut obtinerem compendium tironibus gratum.

The asterisk was omitted in the first edition. This paragraph was translated by Sprague and Exell[1] as follows: "Only in doubtful cases was it necessary to cite descriptions, and those, straightforward ones, so that I might keep the handbook suitable for beginners," and

[1] Journ. Bot. lxxv. 78 (1937).

by Furtado:[1] "Only in the case of obscure plants was it necessary to indicate with an asterisk such descriptions as were straightforward, so that I might keep the *compendium* suitable for beginners." "*Compendium*" is explained by Furtado, I believe not correctly, as the "list of synonyms or citations, *i. e.* the synopsis of the species under consideration." I agree with the translation by Sprague and Exell, except that I should substitute the word "add" for "cite." But Linnaeus himself gave an explanation of his use of the asterisk in *Philosophia Botanica* 255 (1751): "In completo Synonymorum cohorte *Inventorem* Asterisco notare placet." [In a complete list of synonyms it is well to note the inventor[2] by an asterisk.] In *Genera Plantarum* Linnaeus used the asterisk after generic names to indicate that he had seen a living plant of the genus, but that usage evidently has nothing to do with the case under discussion. I venture the opinion that the asterisk after "Descriptiones"[3] had reference to a footnote which was never published. There seems to be no connection whatever between that asterisk and the one used in the citations.—H. K. Svenson, Brooklyn Botanic Garden.

[1] Gardens' Bull. Straits Settlements ix. 311 (1937).

[2] i. e. the first describer.

[3] By this term I believe Linnaeus had reference to added descriptive notes and not to mere citations.

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